

ART 34 AND 17

1. A method of growing a p-type nitride semiconductor material by molecular beam epitaxy, the method comprising supplying bis(cyclopentadienyl)magnesium (Cp_2Mg) during the growth process.
2. A method as claimed in claim 1 wherein the nitride semiconductor material is p-type $(Ga,Al)N$.
3. A method as claimed in claim 1 or 2 and comprising supplying ammonia gas during the growth process.
4. A method as claimed in claim 1, 2 or 3 and comprising supplying ammonia gas, gallium and Cp_2Mg to a growth chamber, thereby to grow a layer of p-type GaN.
5. A method as claimed in claim 1, 2 or 3 and comprising supplying ammonia gas, aluminium, gallium and Cp_2Mg to a growth chamber, thereby to grow a layer of p-type AlGaN.
6. A method as claimed in any preceding claim, and comprising changing the supply rate of Cp_2Mg during the growth of the nitride semiconductor material.
7. (Cancelled)
8. A method as claimed in any preceding claim wherein the growth process is carried out at a temperature of at least 800°C.
9. A method as claimed in any preceding claim wherein the growth process is carried out at a temperature of at least 850°C.

10. A method as claimed in any preceding claim wherein the growth process is carried out at a temperature of at least 920°C.
11. A method as claimed in any preceding claim wherein the growth process is carried out at a temperature of at least 950°C.
12. A method as claimed in any preceding claim wherein the growth process is carried out at a temperature of 960°C or below.
13. A method as claimed in any preceding claim and comprising supplying Cp₂Mg at a beam equivalent pressure of at least 1×10^{-9} mbar.
14. A method as claimed in any preceding claim and comprising supplying Cp₂Mg at a beam equivalent pressure of at least 3×10^{-9} mbar.
15. A method as claimed in any preceding claim and comprising supplying Cp₂Mg at a beam equivalent pressure of 1×10^{-7} mbar or below.
16. A method as claimed in any preceding claim and comprising supplying Cp₂Mg at a beam equivalent pressure of 1.5×10^{-8} mbar or below.
17. A method as claimed in claim 4, or in any of claims 6 to 16 when dependent from claim 4, and comprising supplying elemental gallium at a beam equivalent pressure of at least 1×10^{-8} mbar.
18. A method as claimed in claim 4, or in any of claims 6 to 16 when dependent from claim 4, and comprising supplying elemental gallium at a beam equivalent pressure of 1×10^{-5} mbar or below.
19. A method as claimed in claim 5, or in any of claims 6 to 16 when dependent from claim 5, and comprising supplying elemental gallium and elemental aluminium at an overall beam equivalent pressure of at least 1×10^{-8} mbar.

20. A method as claimed in claim 5, or in any of claims 6 to 16 when dependent from claim 5, and comprising supplying elemental gallium and elemental aluminium at an overall beam equivalent pressure of 1×10^{-5} mbar or below.
21. A p-type nitride semiconductor material grown by a method defined in any of claims 1 to 20.
22. A semiconductor device comprising a layer of a p-type nitride semiconductor material grown by a method defined in any of claims 1 to 21.
23. A semiconductor device as claimed in claim 22 wherein the layer of nitride semiconductor material is a layer of p-type (Ga,Al)N.